XXV. *On the Chronology of the Hindoos.*
By William Marfden, *Efq. F. R. S. and A. S.*

Read June 24, 1790.

IT is my defign to treat, in the following Paper, of the CHRONOLOGICAL ERAS in ufe among the people of Afia, called *Hindoos*, who profefs in general the religion of *Brahma*, and are confidered as the indigenous inhabitants of India. The elaborate refearches into their recondite writings, made by thofe gentlemen who have applied themfelves to the ftudy of *Sanfkreet* literature, afford us ground to expect confiderable difcoveries in regard to the fcientific attainments of this ancient and celebrated people. Their aftronomy in particular has attracted the attention of the learned in Europe, who fee in it the internal evidence of very remote antiquity, and are difpofed to allow its pretenfions to originality; many ftrong and unequivocal traces indicating that the Greek fchool at leaft derived more than the elements of their knowledge, by no very circuitous channel, from this oriental fource.

Unfortunately for the gratification of rational curiofity, hiftory feems to have been, of all branches of ftudy, that which the Hindoos cultivated with the leaft care, and we regret to find the periods marked by the revolutions of the heavenly bodies, of which other nations have availed themfelves to afcertain and record the important events in human

2   affairs,

affairs, by them unprofitably applied to the dreams of their mythology. The unremitted labour of ages has been devoted to perfecting the calculation of the lunar motions, in which their correctnefs is furpaffed only by the European improvements of very modern times; but, by a ftrange perverfion, the accuracy thence acquired in their prediction of eclipfes, appears to have no other object than that of adminiftering to an idle fuperftition, which it ought to deftroy.

Although the *fabulous* exceedingly prevails in all the ancient documents hitherto introduced to our knowledge, and in none more confpicuoufly than thofe which contain the genealogies and reigns of their early kings (*a*)*, yet we are not haftily to conclude, that this people are deftitute of records of true hiftory. The portion of their literary ftores which we have had opportunity to examine is comparatively fmall. Perfeverance may difcover annals, more or lefs ancient, whofe prefent obfcurity is perhaps occafioned by that very circumftance which conftitutes their real value — the want of the *miraculous*. Some authentic monuments have already been elucidated by the learned fkill of a gentleman, now a Member of the Royal Society. Facts will accumulate by degrees, and acquire authority by mutually bearing on each other; and the Hindoos, like many other nations of the world, may hereafter be indebted to ftrangers, more enlightened by philofophy than themfelves, for a rational hiftory of their own country.

In different parts of India, and even in one and the fame part, we obferve various chronological eras referred to, as well in their aftronomical treatifes, as in their political and private writings. Thefe being productive of confufion, if not clearly underftood and difcriminated, I fhall endeavour to exhibit fuch a comparative ftatement of their refpective commencements

* See the Notes at the end of the Paper.

and coincidences as may tend to remove this impediment to the progrefs of hiftorical knowledge. I am not aware that any attempt has hitherto been made in Europe, to bring them into one point of view; and as an opportunity is hereby given of correcting fome errors that we have been led into by the fanction of refpectable names, I am induced to think, that what I have undertaken will not be confidered as fuperfluous.

My prefent purpofe does not lead me to attempt a difcuffion of what may be termed the *factitious* periods of Hindoo computation, or to explain the nature and duration of the four ages, or *Yoogs*, which this fpeculative people, in the wanton exercife of numerical power, have portioned out from the boundlefs region of time. The three former of thefe divifions, even though the progreffive numbers affigned to them fhould be admitted as the refult of aftronomical combination, can be prefumed to have but little reference to practical chronology, which feems to trace its origin no higher than the commencement of the fourth, or prefent age, denominated the *Kalee Yoog.* This conftitutes the principal era to which I would draw attention, and comprehends within it thefe that follow; the era of *Bikramajit,* the era of *Salabán,* the Bengal era (not ftrictly Hindoo), and the cycle of fixty years.

Before I proceed to a comparifon of their feveral dates, it will be proper to define the nature of the year and its conftituent parts, according to which thefe eras are computed by the *Brahmans,* who are the depofitaries of fcience as well as of religion. Their aftronomical year is the meafure of that portion of time which is employed in a revolution of the fun, from the moment of his departure from a certain ftar in their zodiac, as feen from the earth, till his return to the fame. It is therefore folar and fydereal, and contains, by their calculation,

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365 d.

365 d. 6 h. 12′ 30″; and as they fuppofe the annual move-
ment of the ftars in longitude, or the preceffion of the equi-
noxes, to be 54 feconds of a degree, or 21′ 36″ of time (ad-
mitting, with them, the fun to move at the rate of a degree
each day), their tropical year will be 365 d. 5 h. 50′ 54″ (*b*):
but as the fun really moves over 54″ in 21′ 55″, its length is
ftrictly 365 d. 5 h. 50′ 35″, or 1′ 52″ greater than the tropical
year as determined by MAYER at 365 d. 5 h. 48′ 43″. The
true preceffion being 50″,3, which fpace the fun defcribes in
20′ 25″, the true fydereal year is 365 d. 6 h. 9′ 8″, and con-
fequently the Hindoo year exceeds it by 3′ 22″, or one day in
430 years. If the opinion of aftronomers is well founded,
that a fenfible diminution in the length of the year, as well as
in the angle of obliquity of the ecliptic, has gradually taken
place in the lapfe of many ages, it will follow, that this error
may not have exifted, or been fo great, at the period of adjuft-
ing the Hindoo tables: and when we confider that there appears
no ground to believe their apparatus for obferving was ever
much fuperior to what it is difcovered amongft the Brahmans
of this day (*c*), we are led to wonder at the precifion attained
to in this determination, and which, in the calculation of the
moon's apogee, is ftill more remarkable. The defect of art can
have been compenfated only by the remote antiquity in which
the feries of their obfervations originated, affording an oppor-
tunity of correcting the inaccuracy of particular meafurements
by a mean of large numbers and diftant intervals.

They divide the zodiac into twenty-eight lunar and into
twelve folar conftellations or figns (*d*), and their aftronomical
year commences with the fun's arriving at the firft point of
their conftellation of *Aries*. This divifion of the zodiac, fo
far as the accuracy of their obfervations allows, is connected

with

with the actual phænomena of the heavens, and advances with the apparent motion of the ftars, from eaft to weft, leaving gradually behind it the equinoctial points, and is not, like our zodiac, an abftract divifion of fpace, attached to thofe points, and independent of the ftarry fyftem. Calculating on their principles, the difference of the two zodiacs, or the accumulated amount of the annual preceffion, fince the coincidence fuppofed to be in the year of the Chriftian era 499, is in the the prefent year 19° 21′ 54″.

The length of their months is determined by the time which the fun employs in paffing each fign, and they are accordingly longer in the *apogee,* and fhorter in the *perigee*; that which correfponds with the higher *apfis* being 31 d. 14 h. 39′, and that with the lower 29 d. 8 h. 21′ only. It does not appear, that the Hindoos are accuftomed to enumerate, for civil purpofes, the days of the folar month, but to date from the age of the moon that happens to fall within that month, or frequently from the fimple phafe of the moon (*e*).

Their feftivals and fafts, like thofe of the Jews and Chriftians, being regulated, for the moft part, by the lunar revolutions, they employ on this account, exclufively of the folar, aftronomical reckoning, a lunar year (*f*). This they make to confift ordinarily of twelve months, and each femi-lunation is diftinguifhed into fifteen equal portions, or lunar days, which are fomewhat fhorter than the natural day. In order to preferve its general correfpondence with the folar year, " they reckon " twice that lunation during which the fun does not enter upon " any new fign" (*g*), or, in other words, which falls completely within a folar month; and the obvious reafon for this mode of intercalating is, that as the lunar months take their denomination from the folar month in which the *change* happens, if two new

moons

moons fall within the fame month, they naturally take the fame name, and no irregularity is obfervable. This opportunity of en-creafing the number of lunar months, without embarraffing the reckoning, prefents itfelf, on a medium of a few years, juft as often as is requifite to effect the compenfation. It cannot hap-pen in all the folar months indifferently, their lengths being unequal, and fome of them fhorter than the fynodical lunar month.

The commencement of the folar day is ufually eftimated from funrife, and the fpace between that and the funrife of the following day is divided into *fixty* parts, the length of which muft vary with the fun's unequal courfe through the ecliptic; but for the purpofes of calculation it is fuppofed to be afcertained at the folftices, and is equal to twenty-four of our minutes. The fubdivifions, in like manner, follow the fexagefimal fcale. There is alfo a mechanical divifion of the day and night into *eight* parts, of which four are allowed to the interval from funrife to funfet, and four to that from funfet to funrife. The proportion of length of thefe parts refpectively depends therefore upon the feafon of the year and the latitude of the place, and the divifion is confequently inapplicable to general aftronomy.

The days of the week are denominated from the feven pla-nets, and their arrangement is the fame with that adopted in the weftern parts of the world, proceeding from the fun and moon to Mars, Mercury, Jupiter, Venus, and Saturn (*h*). Friday, or the day of Venus, appears as the firft of the week in their calculations, and probably becaufe the *Kalee Yoog* began on that day; but, in common, the week is confidered by the Hindoos as beginning with Sunday.

<div align="right">Having</div>

Having thus briefly touched upon fuch points of their aftronomy as are immediately connected with the meafurement of time, I proceed to the comparifon of their *eras*, which I fhall firft bring into one general view, and afterwards confider feparately.

Table exhibiting the correfpondence of the feveral *Hindoo eras* with each other, and with the Julian period and Chriftian era.

	Julian period.	*Kalee Yoog.*	Era of *Bikramajit.*	Chriftian era.	Era of *Salabân*	Bengal era.	Cycle of 60 years.
Kalee Yoog, or grand era	1612	0					13
Era of *Bikramajit* .	4657	3045	0				58
Chriftian era . .	4713	3101	56	0			54
Era of *Salabân* .	4791	3179	134	78	0		11
Prefent cycle of 60 years	6460	4848	1803	1747	1669	1154	1
Year 1790 of J. C. (from April) .	6503	4891	1846	1790	1712	1197	44

For better underftanding the above table, it is neceffary to remark, that when the Hindoos quote the year of an era, they do it by the number of the elapfed or complete year; whereas, the common European mode is to date by the number of the current or incomplete year; therefore what we fhould term the firft year of an era, is with them the year *zero*, and their year *one* that which follows; excepting in the cycle of fixty, of which the year *one* immediately fucceeds the laft complete year of the former cycle. The difference in years between any two eras is expreffed by the number appearing at the interfection of the horizontal and perpendicular lines, to which the

names

names of fuch eras are prefixed; or it may be found by fub-
tracting the leffer number from the greater, as they ftand in
any of the horizontal lines, under their refpective names at
the top of the perpendicular columns; thus, the years inter-
vening between the era of *Salabán,* and that of the *Kalee
Yoog,* are denoted by the number 3179, at the interfection of
the two lines, or equally by deducting 1712 from 4891, in
the loweft horizontal line.

In a comparifon of the dates of the earlier Hindoo eras with
the Chriftian era, there occurs a difficulty which it is proper
to confider apart. This arifes from an ambiguity in our man-
ner of reckoning the years before Chrift. It is moft ufual to
pafs immediately from the year *one after* to the year *one before*
Chrift, making the interval of time only one year; but fome
of the beft chronologifts pafs from the year *one after* to the
year *zero,* and from thence to the year *one before*; by which
means the interval between any number of years before and
after Chrift is equal to the fum of thofe numbers; and as this
method is ufed in almoft all aftronomical tables, it may, with-
out impropriety, be called the *aftronomical,* and the other the
common method. The following rules will facilitate the reduc-
tion of the feveral Hindoo years to thofe of the Chriftian era,,
and to the years before it.

To find the year of Chrift cor-refponding with a giv-en date of the
$$\left\{ \begin{array}{l} \textit{Kalee Yoog,} \\ \text{E. of } \textit{Bikra-} \\ \quad \textit{majit,} \\ \text{E. of } \textit{Salabán,} \\ \text{Bengal era,} \\ \text{Prefent cycle,} \\ \quad \text{of 60 years,} \\ \text{Enfuing cy-} \\ \quad \text{cle,} \end{array} \right\}$$
when the date is pofterior to our era,
$$\text{fubtr.} \left\{ \begin{array}{l} 3101 \\ 56 \end{array} \right\} \text{from it.}$$
add
$$\left\{ \begin{array}{l} 78 \\ 593 \\ 1746 \\ 1806 \end{array} \right\} \text{to it.}$$

But

But when the date is prior to our era, fubtract the

year of {
  { Kalee Yoog from { 3102 for *common* method.
  {   { 3101 for *aftronomical* method.
  { Bikramajit from {   57 for *common* method.
  {   {   56 for *aftronomical* method.

As the Hindoo year begins in our month of April (which will be particularly explained), we muft obferve, in reducing any Hindoo date to the Chriftian era, that when it happens between the commencement of our year and theirs, the number of their year muft be increafed by one, and the fubtraction or addition then made as above directed.

The *Kalee Yoog*, or principal chronological era, began in the year juft fpecified, when the fun's mean place was in the firft point of the conftellation *Aries* of the Hindoo zodiac; which happened on the 18th of February, at funrife (*i*), under their firft meridian, called the meridian of *Lanka*. At that period, it is faid to be afferted by their aftronomers, that the fun, moon, and all the planets, were in conjunction, according to their mean places. The reality of this fact, but with confiderable modification, has received a refpectable fanction from the writings of an ingenious and celebrated Member of the French Academy of Sciences, who concludes, that the actual obfervation of this rare phænomenon, by the Hindoos of that day, was the occafion of its eftablifhment as an aftronomical epoch (*k*). Although M. BAILLY has fupported this opinion with his ufual powers of reafoning, and although abundant circumftances tend to prove their early fkill in this fcience, and fome parts of the mathematics connected with it (*l*), yet we are conftrained to queftion the verity or poffibility of the obfervation, and to conclude rather that the fuppofed conjunction was, at a later period, fought for as an epoch,

epoch, and calculated retrofpectively. That it was widely mifcalculated too, is fufficiently evident from the computation which M. BAILLY himfelf has given of the longitudes of the planets at that time, when there was a difference of no lefs than 73° between the places of Mercury and Venus. But fifteen days after, when the fun and moon were in oppofition, and the planets far enough from the fun to be vifible, he computes that all, excepting Venus, were comprehended within a fpace of 17°; and on this he grounds his fuppofition of an actual obfervation.

Calculating from the rules laid down by the Brahmans (as given by M. LE GENTIL), it appears, that 4891 mean years of this era expired on Monday, 12th April, 1790, at 4½ h. and that the true place of the fun came to the firft of Aries, and confequently that the 4892d year (or 4891 complete, as the Hindoos exprefs it) actually began on the 10th, at 1 h., or on Sunday, 11th April, in their civil way of reckoning (*m*). Thus we fee that, during this long period of time, the Hindoo account has loft upon the Julian 42 days, allowing for the change that took place in our ftyle. The year of the former exceeding the latter by 12′ 30″, falls continually later and later on our old ftyle year, at the rate of a day in about 115 years; and from this the commencement of any future year may be readily computed. The annual irregularity obfervable, which is independent of this almoft imperceptible change, arifes only from our mode of intercalating a day at the end of every fourth year, to compenfate the fractions that have accumulated during that time. The Hindoo aftronomical year, admitting of no intercalation, cannot preferve an annual correfpondence, but began at nearly the fame time, with refpect to our year, in 1786 as in 1790; in 1775

and 1787, fix hours later; in 1781 and 1785, fix hours fooner; and in 1784 and 1788 (being leap years) eighteen hours fooner than in 1787. The civil year begins at the funrife immediately preceding the calculated commencement of the aftronomical, when that happens during the day; but if in the night time, it begins at the funrife following, and will confift of 366 days fo often as the excefs of the aftronomical year above 365 amounts to a whole day.

The next era that prefents itfelf, and the firft that has pretenfions to be confidered as hiftorical, is that of *Bikramajit* (*n*). This prince, whofe paternal kingdom was *Malwa,* and his capital *Ougein,* waged war againft *Saka* king of *Dehli,* probably his lord paramount, and having overcome and flain him, afcended in his ftead the principal throne of India. Authorities differ widely as to the length of his reign (*o*); but he likewife is faid to have fallen in battle, fighting with a king who invaded him from the fouthern provinces. He appears, from this account, in no other light than that of an unfortunate ufurper, yet his fame in the memory of the Hindoos has eclipfed that of his predeceffors, his adventures are a favourite fubject of romance, and an era has been diftinguifhed by his name. It is doubted, whether we ought to confider his accef-fion, or his death, as conftituting the proper epoch; but with regard to the time from which the reckoning dates there is no uncertainty, and the nature of the event is not effentially connected with our prefent object. It is placed in the year 56 before Chrift, or in the 4657th of the Julian period, and correfponds with the 3045th year of the grand era (*p*).

I had occafion to remark, when treating of the *Hejerà,* that this Mahometan era was computed, not from the day of the Prophet's flight, as generally fuppofed, but from the ordinary

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commencement of that year in which the flight happened (*q*);
and thus we find, on comparing the Hindoo eras, that though
fome of them are profeſſed to be counted from the deaths of
their kings or other hiſtorical events, they yet all begin from
the fame point of the fun's annual courfe through the zodiac.
The numerical reckoning of the years can well be conceived
more liable to arbitrary change, as being lefs intereſting to the
bulk of the people, than the obfervance of a particular day,
whofe periodical return is every where marked with popular
ceremonies and fuperſtitions.

The era to which *Salabán* has given name dates from the
78th year of Chriſt, or 4791ſt of the Julian period, com-
mencing with the 3179th year of the grand era. As this is
no lefs than 134 years later than that of *Bikramajit*, it feems a
bold anachronifm to make them cotemporaries, or to fuppofe,
what is commonly aſſerted, that the one prince was the con-
queror of the other (*r*). Fortunately for my prefent inveſti-
gation, it is hiſtory rather than chronology which fuffers from
this want of accuracy or difcrimination in the annaliſts of
India, or their Perfian tranflators. *Salabán*, who is faid to
have reigned many years over the ancient kingdom of *Narſinga*,
in the northern part of the peninfula, is defcribed as a liberal
encourager of the fciences. There is reafon to think, that
aſtronomy experienced a reformation and confiderable improve-
ments under his aufpices; and the profeſſors appear to have
attached the celebrity of an era to his death, in refpeſt for his
talents and gratitude for his protection.

As the era of *Bikramajit* prevails chiefly in the higher or
northern provinces of India, fo does that of *Salabán* in the
fouthern, but more exclufively. In their current tranfaſtions,
however, the inhabitants of the peninfula employ a mode of

computation

computation of a different nature, which, though not unknown in other parts of the world, is confined to thefe people amongft the Hindoos. This is a cycle, or revolving period, of fixty folar years, which has no further correfpondence with the eras above mentioned than that of their years refpectively commencing on the fame day. Thofe that conftitute the cycle, inftead of being numerically counted, are diftinguifhed from each other by appropriate names, which, in their epiftles, bills, and the like, are inferted as dates, with the months, and perhaps the age of the moon annexed; but, in their writings of importance and record, the year of *Salabán* (often called the *Saka* year) is fuper-added; and this is the more effential, as I do not find it cuftomary to number the cycles by any progreffive reckoning (*s*). In their aftronomical calculations, we obferve, that they fometimes compute the year of their era by multiplying the number of cycles elapfed, and adding the complement of the cycle in which it commenced, as well as the years of the current cycle; but from hence we are led to no fatisfactory conclufion refpecting the origin of this popular mode of eftimating time (*t*). The prefumption is in favour of its being more ancient than their hiftorical epochs. The prefent cycle, of which 43 complete years were expired in April 1790, began in the year 1747, with the year of *Salabán* 1669, and of the grand era 4848. M. LE GENTIL, to whom Europe is chiefly indebted for what is known of Hindoo aftronomy, has fallen into an unaccountable error with regard to the years of this cycle, and their correfpondence with thofe of the Kalee Yoog, as appears by the comparative table he has given of them, and other paffages of his work. He feems to have taken it for granted, without due examination, that the year 3600 of the latter muft have been produced by the multiplication of

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the cycle of fixty into itfelf, and confequently that the firft
year of this grand era muft alfo have been the firft of the
cycle; but this is totally inconfiftent with the fact; the Kalee
Yoog began with the 13th year of the cycle of fixty, and all
the reafoning founded on the felf-production and harmony of
thefe periods muft fall to the ground (*u*).

It now remains to take notice of a mode of reckoning pecu-
liar to the province of *Bengal*, and thence denominated the
Bengal era. The circumftances of its inftitution are involved
in obfcurity, and I do not find that even a conjecture on the
fubject has yet been offered to the world. It is admitted,
however, to have been impofed by the Mahometan conquerors,
and is therefore of no very remote antiquity. The moft ob-
vious confideration that prefents itfelf, in examining the date
of this era, is its proximity to the year of the Hejerà; the
Bengal year 1196 complete ending on the 10th April, 1790,
and the Hejerà year 1204 on the 10th September following.
The difference has plainly arifen from the inequality of the
folar and lunar reckonings, and its accumulation fince a cer-
tain period when they muft of neceffity have coincided; and it
is no improbable fuppofition, that the time of fuch coinci-
dence was alfo that of introducing the mode of computation
which has fince prevailed. By afcertaining the amount of this
difference, and the number of years required to produce it, we
may expect to arrive at a knowledge of the period in queftion,
or to approximate it at leaft. As the Hindoos compute from
the elapfed year, and the Mahometans by the current, the
difference between the two dates fhould be fix years and feven
months; but as this correction of one year may be prefumed
equally applicable at the fuppofed time of the coincidence, and
therefore unneceffary in this inftance, it will follow that the real
                                                        difference

difference fhould be found by a fimple fubtraction of one date from the other, and confequently be feven years and feven months. The annual excefs of the Hindoo or fydereal year above the Mahometan or lunar being 1 o d. 21½ h., an interval of 254 years is required to produce this difference, or 220 years, to produce that of fix years and feven months. The former number being deducted from 1790, carries us back to the year 1536, in the reign of the Mogul emperor *Humaioon*, and the latter to 1570, in that of *Akbar*. About one or other of thefe periods we fhould feek for fome record of the inftitution, but the hiftories we poffefs throw no light upon the fubject. Several gentlemen, converfant in the affairs of Bengal, to whom I have referred it, confirm the general idea as above given, but difagree as to the political circumftances. By one, the regulation is afcribed to *Sheer Shah*, who wrefted the empire from *Humaioon*, and governed it for fome years with wifdom and energy, when his death, and the diftractions that enfued, reftored it to the former poffeffor; and, by another authority, to *Akbar*, defervedly named the Great, who was next in fucceffion.

The moft obvious way of accounting for the peculiar mixture of Hindoo and Mahometan obfervances in this reckoning, appears to be, that the zeal of the monarch for eftablifhing the era of his prophet had effected only a partial or temporary innovation; and that his new fubjects, who were conftrained to adopt as an epoch that year of the Hejerà in which the royal edict bore date, could not ultimately be forced to change their accuftomed folar year for one that rapidly inverted the order of the feafons. But this attempt muft be referred to a period fomewhat earlier than the reigns of thefe particular princes, which were diftinguifhed by a liberal policy; and the

gentlemen

gentlemen above alluded to attribute to them refpectively, not
the interdiction but the *reftitution* of the folar reckoning; that
of the Mahometans, impofed on the province by their more
bigotted predeceffors, being found inconfiftent with the periodi-
cal collection of the revenue, which depends on the harvefts (*v*).
It is, in truth, extremely difficult to conceive, how a mode of
computation, fo much at variance with the rational concerns
of civilized people, can poffibly fubfift in any ftate of fociety
above that of the paftoral and predatory tribes with whom it
originated.

As it appears, that the people of *Siam*, in the farther India,
have borrowed their knowledge of aftronomy from the Hindoos,
it will not be thought inconfiftent with the fubject I am treat-
ing, to add fome account of the chronological eras in ufe
amongft them. Of thefe, one has been termed their civil,
and another their aftronomical era. The civil reckoning is by
lunar years, confifting ordinarily of 12 months each, with an
intercalation of 7 months in the period of 19 years, and com-
mencing with the new moon that precedes the winter folftice.
This era is computed from the fuppofed time of the introduc-
tion of their religion by *Sommona-codom*, 544 years before
Chrift, or in the year of the Julian period 4169; and confe-
quently 2333 years of it were expired in the month of De-
cember, 1789; but by a cuftom which, though not without
its parallel, wants to be fatisfactorily explained, they do not
change the date, or count the fucceeding year 2334, till it
meets the aftronomical reckoning in the month of April fol-
lowing.

The aftronomical era is founded immediately upon the tables
and modes of calculation adopted from the Hindoos. The
French aftronomer, Dom. Cassini, by an ingenious deduction
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from no very circumſtantial *data,* inferred that it muſt have
had for its epoch a mean conjunction of the ſun and moon,
which happened on 21ſt March, 638 of the Chriſtian era.
This preceded by a few hours the commencement of the eſta-
bliſhed Hindoo year, to which it was evidently meant to be
accommodated, though it is by him referred to the vernal equi-
nox, which took place two days earlier (*w*). The length of
the Siameſe ſolar year he found to be 365 d. 6 h. 12′ 36″ (*x*),
and conſequently 1152 years of the era ſhould expire on the
11th April, 1790, when the ſun enters the Indian zodiac, being
560 years later than the era of *Salabán.* For want of corro-
borating facts, this determination of an epoch by M. CASSINI
was conſidered as ſpeculative and uncertain; but I am acciden-
tally in poſſeſſion of a date, which, though not preciſe, may
ſerve generally to authenticate it. " In 1769, the king of
Pegu (a country bordering on *Siam,* and formerly conquered
by it) dates his letter to the French at Pondicherry, the 12th
of the month *Kchong* 1132." This makes 1790 to correſpond
with 1153 inſtead of 1152; but when we conſider the vague
manner in which notices of this kind are given, a difference of
one year can ſcarcely be urged as an objection.

The Siameſe were alſo accuſtomed to make uſe of a cycle of
ſixty years, expreſſed by a repetition of twelve names of cer-
tain animals, which, I obſerve, are for the moſt part the
ſame with thoſe employed, for the ſame purpoſe, by the Chi-
neſe and Mogul Tartars, from whom we may conclude it has
been borrowed (*y*); but the meager and unſatisfactory exam-
ples of its application, furniſhed by M. LOUBERE and P.
TACHARD, do not afford us the means of determining at what
time they began to reckon their cycle. It appears only that the

2   year

year 1687 was the tenth of the leffer or conftituent cycle of twelve years (z).

In the foregoing account of the Indian eras, I am fenfible that I have omitted many circumftances, the detail of which, if accurately given, might be ufeful and interefting; but at this diftance from the countries where thofe eras are employed, the means of information are limited, and particularly with refpect to the variations prevailing in the different provinces of what was formerly the Mogul empire. Unfurnifhed myfelf with local knowledge, my objects have been to compare and reconcile the information already given to the world with the experience of perfons who have refided in Hindoftan, and to correct and fubftantiate the whole by bringing it to the teft of modern accuracy in the fcience of aftronomy. In fulfilling the laft efpecially I confefs myfelf under obligations for effential affiftance.

NOTES.

(*a*) See the French tranflation of the *Bhagavat*, under the title of *Bagavadam* ou *Doctrine divine*, p. 187. et feq. Compare alfo the lifts of ancient kings of *Dehli*, in BERNOULLI, Defcription de l'Inde, Vol. I. p. 153. (from P. TIEFFENTHALER), and Vol. II. p. xxxix. (by M. ANQ. DU PERRON); in the former of which a celebrated *Rajab* is made to reign 90 years, and in the latter no more than 3 years.

(*b*) M. LE GENTIL, Voyage dans les Mers de l'Inde, Vol. I. p. 231. According to the Hindoo Treatife of Aftronomy, called the *Soorya Seedhanta* (of which I have feen fome tranflated extracts), the length of the fydereal year is 365 d. 6 h. 12′ 36″ 33‴ 36⁗, or about 6″½ longer than that given by M. LE GENTIL.

(*c*) Phil. Tranf. Vol. LXVII. p. 598. fee an account, by Sir ROBERT BARKER, of the Obfervatory at *Benares*; and in BERNOULLI, Vol. I. p. 316. and 347. (from TIEFFENTHALER) of thofe at *Jépour* and *Ougein*, conftructed by *Rajab Jéfing*, in the prefent century.

(*d*) The Hindoo names of the folar figns, and of the months with which they correfpond, as alfo of the lunar conftellations or manfions, are as follows:

Solar Signs.	Months.	
1 *Mēfh*	*Bifāk* or *Vifāk* *	April
2 *Breefh* or *Vreefh*	*Jeat* or *Jēfht*	May
3 *Meetoon*	*Afār*	June
4 *Karkat*	*Sāwan* or *Srāvan*	July
5 *Seengh*	*Bhādoon*	Auguft
6 *Kanyā*	*Āfan*	September
7 *Toolā*	*Kārteek*	October
8 *Vreefcheek*	*Āghan* or *Agrahan*	November
9 *Dhanoo*	*Poofh* or *Powfh*	December
10 *Makar*	*Māg*	January
11 *Koombha*	*Phāgan* or *Phalgoon*	February
12 *Meen*	*Chīt* or *Chītr*	March

According to the foregoing lift, the Hindoo year begins with *Bifāk* (anfwering to April from about the 10th of that month); and for this arrangement I have the authority of three almanacs, publifhed at Calcutta, for different years, and by different perfons, as well as that of Mr. HALHED's tranflation of a Code of Gentoo Laws, p. 24.; yet I obferve that M. LE GENTIL, ABRAHAM ROGER, BESCHIUS, WALTHERUS, and all the miffionaries, agree in placing the month

* The former is the common *Hindooftanee*, the latter the *Sanfkreet* orthography: for both I am indebted to Mr. WILKINS.

Chit,

Chit, or *Chitr,* at the head of the year (inftead of the conclufion), and making it to correfpond with April. I can no way reconcile this incongruity, and only remark, that all the authorities for the one practice are from Bengal, and all thofe for the other from the peninfula of India.

<div align="center">Lunar Conftellations.</div>

1 *Afwenee*	15 *Swātee*
2 *Bharanee*	16 *Veefakhā*
3 *Kreetteekā*	17 *Anooradhā*
4 *Roheenee*	18 *Jyēfhta*
5 *Mreegafeera*	19 *Moola*
6 *Adree*	20 *Poorvāfhārā*
7 *Poonarvafoo*	21 *Oottarāfhārā*
8 *Poofhwa*	22 *Abheejeet*
9 *Aflēfhā*	23 *Sravana*
10 *Magha*	24 *Dhaneefhthā*
11 *Poorva-phālgoonee*	25 *Satabheepā*
12 *Oottara-phālgoonee*	26 *Poorva-bhādrapad*
13 *Hafta*	27 *Oottara-bhādrapad*
14 *Cheetrā*	28 *Rēvatee*

The number of the lunar conftellations is more ufually ftated as amounting to twenty-feven only; and that which in the above lift appears as the twenty-fecond, is faid (in the *Ayeen Akbery*) to have been formed out of thofe contiguous, for fome particular purpofe. As the moon's periodical revolution is performed in 27 days and part of the 28th, it is not furprifing that this ambiguity with refpect to the divfion of the zodiac fhould exift.

(*e*) Thus they fay, " on the *full moon* in the (folar) month *Bhādoon*;" " on the moon's increafe in the month *Sāwan*;" " on the firft day of the *bright half* of the month *Bīfāk*." It is to be obferved, that they term the femi-lunation from the change to the full, the *bright* half of the moon, becaufe it is above the horizon during thofe hours wherein it is likely to be vifible. From the full to the change is called the *obfcure* half; becaufe, during the latter part, it does not rife till the hours of reft. See BESCHIUS, Gram. Lat. Tam. p. 167. and Mr. WILKINS, Heetōpadēs, Note 70. to p. 43.

(*f*) Thefe lunar years do not appear to be ever taken collectively, or regarded in computations of time; and the months of which they confift may not improperly be confidered as a lunar divifion of the folar year.

(*g*) P. DU CHAMP (BAILLY, Traité de l'Aftronomie Indienne, p. 320.).

(*h*) This

(*h*) This arrangement of the names of the days, fo different from the order of the planets, is ingenioufly accounted for by COSTARD, in his Hiftory of Aftronomy, p. 156. from the aftrological appropriation of a planet to each of the 24 hours; but the reafoning applies ra:her more directly to the Indian divifion of the day into fixty parts or hours. If we fuppofe, for example, that the fun is made to prefide over the firft hour of Sunday, Mars over the fecond, Jupiter over the third, &c. in their natural order, we fhall find the moon to anfwer to the firft hour of Monday, Mars to the firft of Tuefday, and fo of the reft. To make the rule apply to the European divifion, we muft reverfe the order, and reckon downwards from the fun to Venus, Mercury, and the moon. The Hindoo names for the days of the week are properly as follows, though from the variety of appellations given to the planets, and particularly to the fun and moon, they are fometimes differently called.

Adeetya- *Ravee-* *Soorya-* }*-vara*		Sunday	Solis dies
Chandra- *Sōma-* }*-vara*		Monday	Lunæ
Mangala-	*vara*	Tuefday	Martis
Booddha-	*vara*	Wednefday	Mercurii
Vreehafpatee-	*vara*	Thurfday	Jovis
Sookra	*vara*	Friday	Veneris
Sannee-	*vara*	Saturday	Saturni

(*i*) At funrife, according to M. LE GENTIL and others; but according to the *Soorya-Seedhanta* (before quoted), it is faid to have begun immediately after midnight. This treatife eftimates alfo the diurnal revolutions from midnight, if we may credit the *Ayeen Akbery*, Vol. III. p. 14.

(*k*) " Les Indiens difent qu'à l'inftant du *Caliougam* il y a eu une conjonction generale de toutes les planètes; leurs tables en effet indiquent cette conjonction, et les nôtres montrent qu'elle a pu réellement avoir lieu." Traité de l'Aftron. Ind. p. xxviii. " Le témoignage des Brames eft ici appuyé fur nos tables; et ce témoignage, qui n'a pu être fondé fur un calcul, doit être dû à une obfervation réelle," p. 184.

(*l*) They frequently extract the fquare root, apply the propofition which is the 47th of EUCLID, and appear to have no mean knowledge of fpherical trigonometry.

(*m*) The commencement of the *Kalee-Yoog* being calculated by the Hindoos according to the fun's *mean* place, and the ordinary commencement of their years,

according

according to his *true* place, it becomes neceffary, when they compute the time elapfed from the beginning of their era, until that of any given year, to allow for the difference between the mean and true places at the former period, and on this account they deduct 2 d. 3 h. 32′ 30″ from the whole number of days.

(*n*) This is the common mode of fpelling the name after the Perfian ; according to the Sanfkreet orthography, it fhould be *Veekramadeetya.* The place of his birth is faid to be *Toumma-naggree*, in the north-eaftern part of *Makwa.* Prior to the era of *Bikramajit*, the Hindoos appear to have reckoned by that of *Judifhter* (or *Yoodhe-fhteera*), a king fuppofed to have reigned at *Haftinapoor* about the commencement of the *Kalee-Yoog.* Of this era 3044 years are faid to have expired when the new reckoning was adopted ; but the date is no other than that of the *Kalee-Yoog* itfelf, with the 3045th of which, as is feen by the table, the era of *Bikramajit* commenced. The tranflation of the *Benares Pattra* makes the year of *Judifhter*, 3044, to correfpond with the year 1784 of the Chriftian era.

(*o*) See (*a*), latter part.

(*p*) The copper plate difcovered at *Mongueer*, and tranflated by Mr. WILKINS (Afiatic Refearches, Vol. I. p. 123), is dated in the 33d year of an era fuppofed to be that of *Bikramajit*, who is alluded to in the infcription by an epithet fignifying the *foe of Sakă.* For other ancient dates of this era, fee Afiatic Refearches, p. 287. and 380. M. BAILLY (Traité de l'Aftr. Ind. p. cxxx.), quoting the authority of M. ANQ. DU PERRON, places it 54 inftead of 56 years before Chrift.

(*q*) Phil. Tranf. Vol. LXXVIII. p. 416.

(*r*) Take the two following paffages as inftances. " *Bikermajit* ruled for fome time over the northern parts of the *Deccan* ; but the *Rajahs*, headed by *Salbahan*, having revolted, they gave him battle, and he was flain." F. WILFORD, Afiat. Ref. p. 374. " Bikarmadjit tint fa cour à *Oudjen* ; c'eft à lui que commence l'ere Indienne. Il fut vaincu et tué dans une bataille par *Salbhân* roi *Patane.*" BERNOULLI (P. TIEFFENTHALER), Vol. I. p. 357. The confufion arifing from this anachronifm is increafed by an ambiguity of names ; for that of *Sakă* or *Sak*, which belonged to the predeceffor of Bikramajit, is likewife a name by which *Salabân* is commonly known, and from which his era is called the *Sak-âbda.*

For the relative date of the era of Bikramajit, I have the authority of Mr. WILKINS (Afiat. Ref. Vol. I. p. 130.), who makes 1837 correfpond with 4882 of the *Kalee-Yoog*, and with 1703 of Salabân. Thefe are corroborated in a manner that puts their accuracy out of difpute.

(*s*) The manner of dating appears thus in a grant of land, of which a tranflation is given in the Afiatic Refearches, Vol. I. p. 363. " On the fifteenth of

the

the bright moon of *Cartica,* in the middle of the year *Pingala,* when nine hundred and forty years, fave one, are reckoned as paſt from the time of king *Sáca,* or in figures, the year 939, the moon being then full and eclipfed."

The names by which the years of the cycle are diſtinguiſhed, and of which the ſignifications relate to the fun, as having a good or evil influence, or to the year, as being more or leſs lucky, are as follows:

1 Prabhava	21 Sarvajeet	41 Plavanga
2 Veebhava	22 Sarvadharee	42 Keelaka
3 Sookla	23 Veerooddhee	43 Sowmya
4 Parama-jyōtee	24 Veekreetee	44 Sādhārana
5 Projōtpatee	25 Kara	45 Veerōdhakreet
6 Anggeerafa	26 Nandana	46 Pareetāpee
7 Sree-mookha	27 Veeſhya	47 Pramadeechā
8 Bhava	28 Jaya	48 Ānanda
9 Yoova	29 Manmatha	49 Rakſhafa
10 Dhātoo	30 Doormookha	50 Nala
11 Eefwara	31 Aveelambee	51 Peengala
12 Bahoodhānya	32 Veelambee	52 Kala-yooktee
13 Pramadee	33 Veekāree	53 Sceddhārthee
14 Veekrama	34 Servaree	54 Rowdree
15 Veeſhoo	35 Plava	55 Doormatee
16 Cheetrabhānoo	36 Soobha-kreet	56 Doondoobhee
17 Soobhānoo	37 Sōbhā-kreet	57 Roodrādheekāree
18 Tarana	38 Krōdhee	58 Raktākſhee
19 Pārtheeva	39 Veefwavafoo	59 Krodhana
20 Vyaya	40 Parābhava	60 Akſhaya

(*t*) At the commencement of the era of *Salabân,* 49 years were wanting to complete the current cycle; and, in calculations where it is neceſſary to adjuſt the two reckonings, this number muſt be attended to; but as the objeƈt to be known is not the number of cycles, but the number of the year of an individual cycle, or the correſponding year of the era, it is indifferent whether in their additions and ſubtraƈtions they make uſe of 49 years ſimply, or of 49 added to one or more integral cycles, as 109, 349, or 409, which produce the fame reſult. This ac⸗ counts for the difference of praƈtice remarked by M. BAILLY (p. 51.) in the Brahmans of different cities, and it ſeems to have no relation to the origin of the cycle.

(*u*) M. LE GENTIL, Voyage dans les Mers de l'Inde, Vol. I. p. 240—5. In the common notes of an almanac, publiſhed at *Calcutta,* by Mr. REUBEN BUR⸗

row, the year 1784 is made to correspond with the years 48 and 49 (or *Anund* and *Rakfhefa*) of the cycle of fixty, which appears to have the fanction of a Preface to the Benares *Pattra*, or calendar, of which a tranflation is given, Though reluctant to call fuch authority in queftion, I venture to affert, that the true Hindoo date fhould be 37 and 38, for the former and latter part of 1784. From among a variety of authorities concurring to eftablifh this computation, I fhall produce, in the firft place, that of Befchius, the Author of a Grammar of the *Tamool* language (peculiar to that country in which the cycle is ufed), who has treated briefly, but with great accuracy, of chronology, and given the names of the 60 years in the original character, with the correfponding dates. M. LE GENTIL mentions having poffeffed himfelf of a copy of this work (printed at Tranquebar in 1738), and bringing it with him to Europe. ABRAHAM ROGER (whofe book, entituled, in the French tranflation from the Dutch, *De la Vie et des Mœurs des Brames*, and printed at Amfterdam in 1670, contains much original information refpecting the Hindoos) gives likewife the names of the fixty years; and fays (p. 79.), that the year 1640, in the month of Auguft, correfponded with *Wicrama*, the 14th of the cycle; confequently 1760 with the 14th alfo, and 1784 with the 38th. The communications of WALTHERUS, a learned miffionary, publifhed by BAYER under the title of *Doctrina temporum Indica*, are explicit as to this point. M. BAILLY, in his *Traité de l'Aftronomie Indienne*, adopts in his calculations the date that I have affigned, and gives (p. 326.) the years of the cycle of fixty from P. DU CHAMP, in which 1724 (and confequently 1784) is remarked as correfponding with the 38th year. To this, if it were neceffary, I might add the authority of a *Hindoo date* in the Afiatic Refearches, before quoted, where the year *Pingala* (51) agrees with 939 of *Saca* or *Salabân*. The year 1 of the prefent cycle correfponded with 1669 of the era, according to the table I have given; and therefore 51 of the preceding cycle with 1659, from which deduct twelve whole cycles, or 720 years, and 939 remain; which, as the table was founded on other documents, will be allowed no weak corroboration, the date in queftion being from an ancient copper plate. I obferve, with fome concern, that I differ alfo from Mr. BURROW, both in the year of *Bikramajit* and that of *Salabân*. He makes the interval between them 136 years, whereas, by the authorities I have followed, it fhould be only 134, or 56 years before Chrift, and 78 after. I fhould certainly not be forward to point out thefe apparent inaccuracies but from an apprehenfion, were I to pafs them unnoticed, that my own computations might be condemned on an appeal to thofe of Mr. BURROW's almanac as a criterion. I have not feen any fubfequent to that for 1784, which was the firft.

(*v*) On reference to the *Ayeen Akbery,* or Inſtitutes of the emperor *Akbar,* I find mention made (Vol. I. p. 344.) of an era eſtabliſhed by him, being that of the commencement of his reign, in the year of Chriſt 1556. Although nothing is ſaid of the conformity of its date with the current year of the *Hejera,* yet it is probable that this was the origin of what has ſince been called the Bengal era.

In the province of *Behar,* and ſome other parts of the empire, a year was eſtabliſhed with a view to the revenue ſolely, called the *Fuſſullee* year. It appears to begin, and to take its date, from the month of September preceding the commencement of the common Bengal year, and therefore 1198 ſhould begin in September 1790. Mention is made (in the Alph. Grandonico-Malabaricum, Romæ, 1772) of an era employed in the ſouthern extremity of the peninſula, of which 965 ſhould correſpond with the year of Chriſt 1790.

(*w*) Mem. Acad. des Sciences, Tom. VIII. p. 218. Traité de l'Aſtronomie Ind. p. 18. and 21.

(*x*) This agrees with the Hindoo year given in the *Soorya Seedhanta,* and differs 6″ from that by M. LE GENTIL. Theſe ſmall differences ariſe probably from the forms of calculation, and are not fundamental.

(*y*) The cycle of the Chineſe and Tartars comprehends 60 years, expreſſed by an artificial arrangement of 10 words or particles, prefixed to the names of 12 animals, in ſuch a manner that 6 repetitions of the former coincide with 5 repetitions of the latter, and bring them to the ſame relative ſituation at the recommencement of the cycle.

(*z*) LOUBERE, Relation of Siam, Eng. tranſ. 1693, p. 169. et 202. Journal du Voyage de Siam, par M. L. D. C., Par. 1687, p. 286. Hiſtoire Nat. et Pol. du Royaume de Siam, par N. Gervaiſe, Par. 1688, p. 154, 155.